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ABSTRACT

This paper explores the issue of the acquisition of English word stress by ESL learners whose mother tongue is Cantonese. Based on the theoretical framework of metrical phonology, this study examines the following parameters related to English word stress: branching versus non-branching rime structures, dominance in the metrical foot and the word tree, directionality of rule application and extrametricality. English nonsense words (N=160) were coined according to the parameters being investigated. Two groups of subjects (secondary and university students) were asked to read aloud the test words in sentence frames. The results demonstrated regular stress patterns, indicating that learners were sensitive to variables such as rime structures, syntactic categories and number of syllables. The regularity observed is consistent with the metrical framework adopted for analysis, which reflects the fact that the interlanguage system of learners can be explained in terms of the same types of principles of other natural languages. some interesting irregularities also emerged, suggesting that learners were trying to resolve an inherent difficulty in the acquisition of English word stress--learning that the metrical foot of the language is right dominant while its word tree is left dominant. (Author/JL)

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# The Stress Patterns of Nonsense English Words of Cantonese-speaking ESL Learners[1]

Cathy Sin Ping Wong

## ABSTRACT

This paper explores the issue of the acquisition of English word stress by ESL learners whose mother tongue is Cantonese. Based on the theoretical framework of metrical phonology detailed by Hayes (1981), this study examines the following parameters related to English word stress: branching versus non-branching rime structures, dominance in the metrical foot and the word tree, directionality of rule application and extrametricality.

160 English nonsense words were coined according to the parameters being investigated. Two groups of subjects (secondary and university students) were asked to read aloud the test words in sentence frames. The results demonstrated regular stress patterns, indicating that learners were sensitive to variables such as rime structures, syntactic categories and number of syllables. The regularity observed is consistent with the metrical framework adopted for analysis, which reflects the fact that the interlanguage system of learners can be explained in terms of the same types of principles of other natural languages. Some interesting irregularities also emerged, suggesting that learners were trying to resolve an inherent difficulty in the acquisition of English word stress -- learning that the metrical foot of the langauge is right-dominant while its word tree is left-dominant.

The study on how ESL learners acquire English word stress is important not only because it sheds light on the intricate system of interlanguage phonological system of ESL learners in the aspect of suprasegmental features, but it also reveals how they understand and learn the complex interaction of word stress with morphology and syntax in the English language. Before I describe the research design and present the findings and discussions of the

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[1]This paper is based on my M.Phil. thesis entitled *The Acquisition of English Word Stress by Cantonese ESL Learners* (1991) submitted to the Chinese University of Hong Kong . I would like to take this opportunity to thank Dr. Thomas Lee, who is the supervisor of my thesis, Dr. Teresa Ching and Dr. Eric Zee, who are on the thesis committee and Professor Fred Eckman, who is the external examiner of my thesis for their invaluable advice and comments. (Correspondence address: c/o Dept. of Linguistics, University of Hawaii at Manoa, 1890 East-West Rd., Honolulu, HI 96822. Email: spwong@uhccux.bitnet)

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present study, I will briefly introduce the theoretical framework adopted for analysis, which is detailed in Hayes (1981).

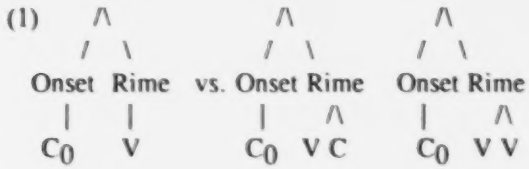
## 1. Metrical Phonology -- Hayes (1981)

Hayes' (1981) doctoral dissertation investigated the stress systems of various languages, and established a metrical theory of stress which entails a set of universal parameters. Within such a framework, the stress patterns of various languages are highly predictable as long as the settings of several parameters are known. This is especially significant in attempting to describe and explain learners' patterns and errors in terms of parameter-setting (Flynn and Espinal 1985; Flynn 1987; Phinney 1987; White 1987).

Crucial to stress placement in Hayes' framework is the concept of **branching** versus **non-branching rime structures**, **extrametricality**, **stress rules** and **word tree construction**.

**Rime structures**, according to Hayes, enable us to distinguish a heavy syllable from a light one (or a strong from a weak one). Example (1) graphically illustrates the rime structures of weak versus strong syllables:

(1)




(a) (b) (c)

If a syllable is viewed to be composed of the onset and the rime, (1a) represents a rime structure with only a single vowel, (1b) a vowel plus a consonant, (1c) a long vowel or a diphthong (both can be considered to be geminates of vowels). Thus, (1a) is regarded as a non- branching rime, while (1b) and (1c) are branching. Hayes concluded that when considering stress placement, the distinction between a strong versus weak syllable could now be determined solely on the basis of the rime structure of a syllable.

Another factor which influences stress placement is **extrametricality**. 'In the metrical theory of stress, a syllable is called *extrametrical* if it is ignored by the stress rules; that is, treated as if it were not there.' (Hayes 1982: 227) This captures the insight that the final consonant of a word is extrametrical (i.e. treated as if it were not there when English Stress Rules are applied) and so is

the final syllable of a noun. Consonant Extrametricality accounts for the fact that final VCC rimes are treated as weak syllables (VC). Similarly, Noun Extrametricality accounts for the rarity of finally-stressed nouns and the difference in primary stress of the noun/verb pairs such as 'ABstract' (noun) / 'abSTRACT' (verb).

In Hayes' framework, the **English Stress Rule** is as follows:

(2) English Stress Rule (Hayes,1981: 150)
At the right edge of the word, form a binary foot on the rime projection, with the left node dominant.

According to Hayes, the stress rules assign stress foot status to the rimes. What (2) means is that if the final rime branches, it receives the foot status; if it does not, it is the weak node and correspondingly, its sister node (the left one) will be strong.

After the stress rules have assigned stress foot status to the rimes, these feet are constructed into a right-dominant **metrical word tree**. These two processes relate to the notion of dominance. In Hayes (1981), he explains that the world's languages differ in whether they are right-dominant or left-dominant at both the syllable level and the foot level. If a language is left-dominant, then only the left node may branch; and, by the same token, only the right node may branch in a right-dominant case. In English, the foot structure is left-dominant while at the word level, it is right- dominant. Example (3) illustrates the derivation of stress placement in the noun 'ABstract' and the verb 'abSTRACT':

(3)

| (noun) | (verb) | |
|---|---|---|
| abstract | abstract | |
| ab act | ab act | Rime Projection |
| ab act | ab act | Con.Extrametricality |
| ~~act~~ | N.A. | Noun Extrametricality |
| | | Stress Rule |
| N.A. | | Retraction Rule |
| s w | w s | |
| | | Word Tree Construction |

The metrical theory of Hayes has made it possible for researchers to identify the areas for investigating the acquisition of English word stress. In

acquiring the word stress of English, learners have to be aware of a number of properties of the metrical structure before they are able to acquire the stress pattern of English. These properties include:

(4) (a) branching versus non-branching rime structure
(b) foot construction
(c) word tree construction
(d) extrametricality

## 2. Studies on the Acquisition of Stress by ESL learners

Several studies have been done on the acquisition of English word stress of ESL learners (Baptista 1989; Mairs 1989).

Baptista (1989) examined the errors made by ESL learners whose mother tongue was Brazilian Portuguese. She found that her subjects employed some strategies which sometimes overlapped and sometimes conflicted with the stress rules, resulting in the errors recorded.

The first strategy she mentioned relates to transfer from the mother tongue. She examined the stress pattern of English words which had Portuguese cognates and found that the most common type of transfer was that the subjects put the primary stress in the English words on the syllable which bore secondary stress in Portuguese cognates. She concluded that the learners seemed to be aware of the fact that the two languages did not correspond to each other in their stress pattern, but somehow, they `cannot control the natural and probably unconscious tendency to look for at least an indirect correspondence'(Baptista 1989: 6).

The second phenomenon observed by Baptista is that learners have a tendency to stress an `early syllable'. This means that learners tend not to stress the final syllable of an English word. This strategy accounts for the high percentage of correct responses in test words which are predicted to have primary stress on the second syllable on the one hand and poor performance in words which are predicted to be finally-stressed (e.g. kangaroo, employee) on the other.

Mairs (1989) employed the metrical theory to explain some of the errors found in her Spanish subjects' pronunciation of English words. She found that in general the Spanish speakers she investigated demonstrated stress patterns very similar to those of the native speakers. However, there is a set of errors which can be explained in terms of the metrical theory. She discovered that the subjects of her study had a general tendency to stress the syllable which was in a -VGC# rime configuration. For example, 'adVERtisement' will be stressed as

'adverTISEment', 'INterview' will be pronounced as 'interVIEW'. She compared the Spanish and the English stress system within the theoretical framework of Hayes (1981). It was explained that in the Spanish stress system, the -VGC rime was a marked rime structure for the Spanish subjects. And this prevents the application of the English Extrametricality Rule to this rime structure. This adjustment in the stress assignment process results in the incorrect output of these subjects. Mairs has demonstrated that by employing the metrical theory, the interlanguage system of some ESL learners is better understood.

The present study intends to explore the stress patterns of Cantonese-speaking ESL learners in the light of the metrical theory.

Since the metrical theory of Hayes has formalized some universal parameters of stress, the stress patterns of the ESL learners can be analyzed along the setting of the values of these parameters.

The main objective of this study is to identify and examine the stress patterns of Cantonese ESL learners. Are these patterns approximate those of the native speakers' as described by Hayes (1981)? Are learners sensitive to branching versus non-branching rimes, syntactic categories and the structure of metrical feet and word trees? Will there be any strategies employed by learners reflected from their patterns?

## 3. Methodology

Based on the consideration of branching versus non- branching rime structures, 40 different syllable types were identified to test 2-syllable nouns and verbs, 3- syllable nouns and verbs and 4-syllable nouns. For each syllable type, 4 test words were coined, making a total of 160 nonsense words. These words were put in 2 sentence frames like the ones listed in (5) below:

(5) (a) I can _____. (verb)
(b) This is a nice _____. (noun)

Subjects were asked to make recordings of the 160 sentences, but they were not told that word stress was the focus of this study. The subjects of this study included 8 university students, 8 secondary students of F.4 (Grade 10) level and 2 native speakers of English. Broad transcriptions were made of the recordings with the primary stress identified, based on perceptual judgment of two transcribers. Words with the intended syllable structures maintained were then tallied for an item analysis. Examples of some of the results of the item

analysis are given in the appendix.[2]

The stress patterns of the subjects were classified into the regular and irregular types. This is reflected in two levels -- the individual test word level and the syllable type level. At the test word level, regularity is revealed by the number of responses for each individual test word. If all 8 subjects (or the majority of the subjects[3] ) assigned stress to the same syllable for a test word, that particular test word is assumed to have a regular pattern (e.g. 'toisapaw' in Table 1). At the level of syllable structure, the stress pattern of a certain syllable type is revealed by the number of `regularly-stressed' test words. Since each syllable type consists of four test words, if all four test words (or 3 out of 4) with the same syllable structure consistently have the same syllable receiving the stress placement from the majority of subjects, that syllable type is considered to have a 'regular' stress pattern. The test results in Table 1 indicate such a pattern. If either one of the two criteria is not satisfied, the stress pattern is regarded as 'irregular', such as that shown in Table 2.

## 4. Findings

Table 3 in the Appendix summarizes the stress patterns observed in the present study. For ease of reference, some notational conventions are employed. Since the syllable structures are based on a branching versus non-branching concept, B is used to indicate a syllable with a branching rime and an N for one with non- branching rime structure. For example, a BN refers to a 2-syllable test word in which the initial syllable has a branching rime while the final syllable has a non- branching one.

Among a total number of 40 types of test words (12 types of verbs and 28 types of nouns of different syllable structures), 30 of them showed regular and rule- predicted patterning, only 10 of them showed irregular patterning. Moreover, verbs and nouns of the same syllable structures showed different stress patterns, indicating that subjects were sensitive to syntactic categories

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[2] The tables referred to hereafter are all included in the appendix.

[3] In some cases, such as the 4-syllable test words, most of the secondary students were unable to give a response that was without modifications of the intended syllable structures. The number of responses tallied was thus very low. Therefore, the pattern of such items will be based on the results of the university students.

when deciding on word stress. In the following sections, the results of 2-syllable nouns and verbs will be examined first; then followed by the 3- syllable nouns and verbs and finally, the 4-syllable nouns.

2-syllable words

Of all the four types of BN, NN, BB and NB 2-syllable verbs, (e.g. kouba, haca, abnaw, bagoy etc.), the BN and NN types showed regularity while the BB and NB types did not. When the test words in these two categories were further scrutinized, it was found that three of the test words ending in final VV attracted the stress onto the final syllable, while the other four test words which did not end in VV but VCC rime structure resulted in more subjects placing the stress one syllable earlier, on the penultimate syllable, which was not predicted by rule. Thus, irregular patterns emerged. The findings suggest that identifying a sub-class of final rimes (i.e. the VV final rime in this case) as stress-bearing may be one of the strategies employed by some ESL learners. This shows that learners are indeed sensitive to rime structures.

On the other hand, all the four types of BN, NN, BB and NB 2-syllable nouns (e.g. harsi, nita, teewaw, mitern etc.) with the same rime structure as the 2-syllable verbs received regular stress patterning. This reveals that learners are indeed sensitive to verb/noun distinction when considering stress placement.

3-syllable words

In 3-syllable verbs, 4 of the 8 syllable types yielded regular patterns. These syllable types are NNB, BNB, BBN and NBN (e.g. melabaw, toisapaw, poiveytik, setaiba etc.). They are of the rime configuration of either an XNB or an XBN type (X can be branching or non- branching). In all the four cases, the stress patterns of the subjects correspond to that predicted by rules. On the other hand, words of the syllable types BBB, NBB, BNN and NNN (e.g.bawtigpai, belailai, tarweta, hipisa etc.) did not yield regular stress patterns. These syllable types, which presented problems for the ESL learners, are either in an XBB or XNN configuration of rime structures, with identical rime structures in the last two syllables.

One might speculate that the irregularity is due to the deviation of these rime structures from the canonical `strong-weak' form of an English metrical foot. The regularly-stressed types are of the configurations of either XBN or XNB. The last two syllables of the XBN type are in accordance with a canonical left-strong metrical foot. As for the XNB type, the final syllable is a branching rime, which automatically becomes a metrical foot by itself; leaving

the remaining two syllables to form a branching left-strong metrical foot, which goes in accordance with the canonical nature of a left-strong metrical foot. This is easy for learners. The XNN type shows irregular stress patterning because a metrical foot formed by two consecutive NN syllables with the left node dominating a non-branching rime is a non-canonical one. Learners may be unwilling to assign primary stress to a non-branching syllable, forming a non-canonical foot. Similarly, the XBB type results in a branching rime being dominated by the weak node of a metrical foot, violating the canonical left-strong nature of a metrical foot.

In contrast to the verbs, the stress patterns of the 3-syllable nouns are much more regular. If the penultimate syllable is a non-branching rime, in the cases of NNB, NNN, BNB and BNN (e.g. leisitay, pacaba, moulikoy, farnita etc.) the stress falls on the antepenultimate syllable. In all other cases, that is, NBB, NBN, BBB and BBN (e.g. dikaimoy, saberna, laitapzaw, tarharlin), in which the penultimate syllable is a branching rime, the words are stressed penultimately.

4-syllable words

Half of the 4-syllable nouns (i.e. 8 types) showed regular stress patterns; a quarter showed irregularity. The remaining one quarter fell in between the two (cf. Table 3). Instances in which subjects placed the stress on the final or initial syllables were extremely rare. Among the 16 syllable types of the 4-syllable nouns, 12 types showed a different tendency for penultimate or antepenultimate stress. These syllable types of the regularly-stressed test words can be divided into three configurations. For words of the configuration of XBNY (e.g. toizetmazaw, nawtikmita, wipoisikay, ditaysila etc.) and XNNY (e.g. tawpabelai, terniseba, tapibelai, tetiseba etc.), the stress was placed on the ante-penultimate syllables by learners, the same as predicted by rule. For words of the configuration XNBY (e.g. filiboitai, dagataiga, leesikatpai, daitipoosin etc.), the penultimate syllables were stressed by learners, again as predicted by the stress rules. The remaining four syllable types which did not reveal any regular stress patterns are of the configuration XBBY. In all the cases of the BBBB, BBBN, NBBB and NBBN syllable types (e.g. laitipmagtye, teepikmawtet, feparvindai, mitoiseenit etc.), the stress was found to fall either on the penultimate or antepenultimate syllable with no particular tendency observed.

## 5. Discussion

Having presented the overall stress patterns of the subjects of the present study, I discuss below these results with reference to the issues related to English word stress and second language acquisition.

### 5.1. The Metrical Theory and the Stress Patterns of ESL Learners

It has been pointed out in Section 4 that 30 out of the 40 syllable types yielded regular stress patterns which are in accordance with those predicted by the metrical theory. This shows that the interlangauge system of these ESL learners conform to the same types of principles governing other 'natural languages, that is to say, 'primary languages' (Eckman, personal communication).

In this section, the results of this study are examined in detail with reference to the various components of the metrical theory.

#### 5.1.1. Rime Structures

So far, it has been shown that the ESL subjects in this study are sensitive to branching and non-branching rime structures. Nevertheless, careful examination of the data indicates that they may have a slightly different concept of branching from that of the native speakers as described in the metrical theory of Hayes (1981).

There are four types of rime structures which are being investigated in the present study: VV (a long vowel or a diphthong), VCC (a short vowel plus at least two consonants), VC (a short vowel plus one single consonant) and V (a single short vowel). According to the metrical theory of Hayes, because of Consonant Extrametricality in English, branching rimes when appearing finally are VV and VCC while non-branching rimes are VC and V. In non-final position, only a V rime will be non-branching. This branching versus non-branching rime structure dichotomy dictates the operation of English word stress assignment.

From the data gathered from the ESL learners in this study, there is evidence that these subjects, though sensitive to the concept of branching rime structure, may have a different assumption about what constitutes a branching or non-branching rime. For some subjects, only the VV rime structure is considered as branching, while all the other three (VCC, VC and V) are treated as non- branching, regardless of whether they appear finally or non-finally.

In the 2-syllable verbs with rime structure types BB and NB (Tables 4

and 5), test words with a VV rime in both types received predominantly final-stress responses. However, test words with a VCC final rime showed penultimate stress contrary to rule.

Similarly, the 2-syllable nouns generally received penultimate stress, as predicted by rule. However, more final-stress responses were recorded if the final rime was VV than if it was VCC (Tables 6 and 7).

A similar observation is also made about the VV/VC distinction in some 3-syllable nouns. In Table 8, the number of rule-predicted penultimate-stress responses was greater in `tarHARlin' and `gabSOOma' (both of a penultimate VV rime) than in `takDEMlit' and `kawTIPna' (both of a penultimate VC rime). In other words, some subjects treated a non-final VV rime as branching but a non-final VC rime as non-branching and so shifted the stress to the antepenultimate syllable.

The above observations lead us to hypothesize that in the process of acquiring English word stress, the identification of a branching rime structure is among many of the features that have to be learnt. Furthermore, learners start with a simple dichotomy that treats only a VV rime as branching, with VCC, VC and V rimes considered non-branching. In other words, the coda may be ignored in the definition of a branching rime.

5.1.2. Extrametricality

(A) Consonant Extrametricality

According to Hayes, Consonant Extrametricality applies to the right edge of an English word before stress assignment is considered. This is useful in distinguishing a VC rime structure in final from non- final position. Since a VC syllable in final position behaves as if it were a non-branching rime but in non- final position behaves like a branching rime, Hayes proposes the rule of Consonant Extrametricality so as to give an account of the behaviour of the VC syllable in terms of the rime branching concept.

The stress patterns of the ESL learners of this study show that they treat final VC syllables as non- branching rime structures. (cf. the results of 2-syllable verbs in Tables 9 and 10[4] ; the data on 3-syllable verbs in Tables 11

[4] Note the difference in performance of the two groups in the word `vekan' in Table 10.

and 12).

However, the treatment of a final VC syllable as non-branching may not have been due to operation of Consonant Extrametricality in the ESL learners. As discussed in Section 5.1.1. above, the ESL learners had a tendency to treat only syllables with VV rimes as branching. Then the VCC, VC and V syllables are regarded as non-branching. Viewed in this way, Consonant Extrametricality may not have been assumed by the ESL learners. Learners following this pattern would therefore not have stressed any final syllable with a consonant coda, giving the impression of observance of Consonant Extrametricality.

(B) Noun Extrametricality

In Hayes' theory, the difference between syntactic categories is accounted for by Noun Extrametricality. If the word is a noun, the entire final rime structure is excluded when stress rules apply.

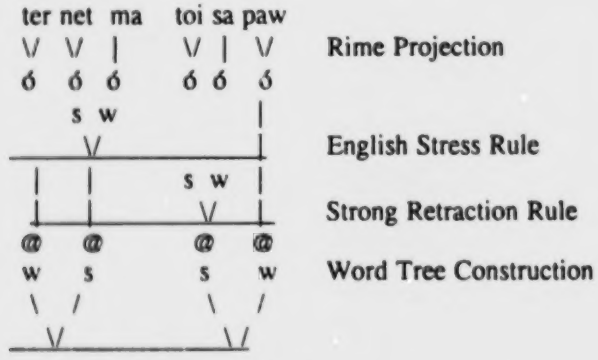
It is one of the hypotheses of this study that syntactic category does play a part in learners' placement of stress. This has been verified by the present investigation. If the learners had not treated the two categories differently, the same syllable rime structures should have yielded exactly the same stress patterning regardless of whether the word is a noun or a verb. As shown in Table 3, the stress patterns show that if the word with a BB or NB rime structure was a verb, the stress fell on the final syllable, but the stress was on the penultimate syllable in nouns (cf. Table 4 for BB verbs, Table 6 for BB nouns; Table 5 for NB verbs and Table 7 for NB nouns). With respect to the 3-syllable BBB, NBB, BNN and NNN types, the stress patterns of the nouns appeared rather regular but those of verbs were irregular. Thus, it is clear that the learners were sensitive to the syntactic category of the word concerned when assigning stress to it. But should this knowledge be captured in the form of Noun Extrametricality in the ESL learners' interlanguage system or should it be described as the effect of a learner strategy?

The data from the present study indicate that except for the 2-syllable verbs, no final-stress patterns were observed. Could the exclusion of the final syllable, therefore, have been the result of a simple strategy of avoiding stressing the final syllable, since exposure to English would give evidence to learners that English words of three syllables or more, are rarely stressed finally?

Since the lack of final stress in 2-syllable nouns can be attributed to either Noun Extrametricality or the strategy of avoiding final syllables, an examination of the 2-syllable words will not shed light on this issue. Let us consider the 3-syllable words.

Within Hayes' metrical theory, if the rime structure of the final syllable in a 3-syllable verb is non- branching, it automatically becomes the weak node (and its sister node or the adjacent syllable strong); the final two syllables thus form a metrical foot. The remaining first syllable builds a single-node foot after Strong Retraction Rule. The output of this process is that the penultimate syllable receives the primary stress. On the contrary, if the final syllable consists of a branching rime structure, a foot is automatically constructed and the primary stress invariably falls on the antepenultimate syllable because the Strong Retraction Rule will assign a left-strong foot to the remaining two syllables, yielding a branching left foot in the final step of Word Tree Construction. Therefore, in a 3-syllable verb with a final branching rime, the primary stress falls on the antepenultimate syllable. The examples in (6) illustrate this.

(6)




The pattern of not placing the stress in the final syllable of 3-syllable verbs may be explained in terms of the theory explicated above. As in the case of 2- syllable verbs, this however, can also be attributed to a simple learner strategy of ignoring the final syllable in 3-syllable verbs. But additional evidence goes against the learner strategy hypothesis. If it was the case that learners were simply avoiding the final syllable,one should expect that the same stress pattern will emerge for the syllable types BBB and BBN (cf. Table 11 and Table 13) of the 3-syllable verbs. This is because if the final syllable was ignored, the remaining two would be exactly the same, and thus the stress pattern of BBB and BBN words should be no different from each other. Similarly, pairs which differed only in final syllable rime structure such as BNB and BNN, NBN and NBB as well as NNB and NNN should have nearly identical stress assignment. However, the results demonstrate that they show strikingly different patterning. In all these pairs, only those with a XBN or

XNB rime combinations showed regular tendencies, while those in the configurations of XBB or XNN were irregularly patterned. This indicates that the final syllable plays an important role in stress assignment in 3-syllable verbs. In other words, the simple learner strategy of ignoring the final syllable in 3-syllable verbs is not the reason accounting for the lack of final- stress patterns in three-syllable verbs.

Based on this analysis, we could argue further that the avoidance strategy for 2-syllable nouns should also be rejected in favour of Noun Extrametricality.

The avoidance strategy hypothesis would give rise to further false predictions: it would predict that the 4-syllable nouns would be stressed like those 3-syllable verbs. If the final syllable played no role, all the different 16 types of rime structures could be collapsed into exactly the same 8 types designed for the 3-syllable verbs. The stress patterns of, for example, the BNBB and BNBB types of 4-syllable nouns should have a stress pattern identical to the BNB type of 3-syllable verbs. This is obviously not the case, since a BNB verb (Table 14) should be stressed initially according to rule, a pattern borne out by the stress patterns of the learners. However, the words in the BNBB and BNBB 4-syllable nouns (Tables 15 and 16) showed no initial stress at all as predicted by the theory. The fact that none of the 4- syllable nouns showed an initial stress pattern proved the avoidance hypothesis wrong.

Noun Extrametricality treats the final syllable of a noun as if it were not there when the English Stress Rule is applied. However, this is not equivalent to saying that the syllable should be avoided or that it plays no role in the assigning of stress. In the course when the word tree is being drawn, the extrametrical syllable is adjoined to a preceding foot and becomes a weak node.

### 5.1.3. Directionality

In English, the stress rule works leftward from the final syllable, and this is where a speaker or learner starts to look for relevant information, such as information about rime structure. If one is not aware of this, or is trying to work from the opposite direction, the English stress system will appear very chaotic to him.

A careful examination of all the patterns in the various categories reveals that the learners exhibit a sense of direction when deciding which syllable in an English word is to be stressed. The regular patterns described in Section 4 can all be accounted for in terms of the learners' sensitivity to final branching in verbs and the application of Noun Extrametricality exhibited by the learners (discussed in the previous section). And the results show that learners are sensitive to the directionality of rule application in English word stress, which is

from right to left. In the 2-syllable verbs, the determining factor is the final syllable -- if it is a VV rime, it receives the stress; otherwise, the stress falls on the preceding syllable. In the 3- syllable verbs, stress falls on the penultimate syllable in the case of a BN final while in an NB case, the stress is on the antepenultimate syllable.

In the noun category, we have established that the learners find the final syllable extrametrical. Therefore, in 2-syllable nouns, the only choice is to stress the penultimate syllable. In 3-syllable nouns, since the final syllable is ignored, what matters is the penultimate one -- if it branches (B), it is stressed; if not, then the antepenultimate syllable is stressed. The 4-syllable nouns are stressed in a similar way to the 3-syllables -- if the penultimate rime is branching, it receives the stress; otherwise, the stress falls on the preceding syllable; if not, the branching penultimate syllable receives the stress. However, in the case of a penultimate branching syllable with an adjacent antepenultimate branching, the learners seem to encounter some difficulty in deciding which syllable should receive the stress. This problem will be discussed in the next section. In the meantime, regardless of this exception, the stress pattern of these ESL subjects does indicate that they are sensitive to directionality in assigning English word stress.

### 5.1.4. Irregular Stress Patterns

All of the regular patterns presented in Table 3 conform to the output as predicted by the metrical theory.

However, there are three types of irregular patterns exhibited in the data. Such irregularity can also be explained in terms of the present theory. The first type of irregularity in fact has been discussed and explained (Section 5.1.1) in terms of the inability of the secondary students to stress a VV final rime.

The second type concerns the 3-syllable irregular verb types. For 14 out of the 16 test words, the numbers of penultimate and antepenultimate stress are quite close to each other. This indicates that the subjects may have been employing different rules. According to the metrical theory, the BBB and NBB structures should be stressed antepenultimately and the BNN and NNN are stressed penultimately when they are verbs, but the reverse should be the case when they are nouns. In other words, the responses of the subjects of these four types can be classified as those that are rule-predicted and those that are not rule-predicted. If we examine those responses not predicted by rule, the stress patterns of the 3-syllable verbs of these syllable types have exactly the same patterns as those in 3- syllable nouns of the same syllable types.

(7)

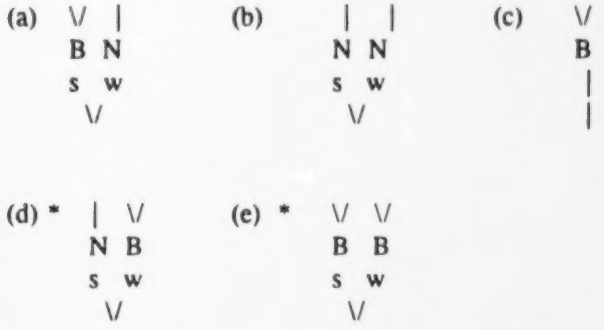
| 3-syllable Verbs | 3-syllable Nouns |
|---|---|
| Rule-predicted | Rule-predicted |
| B B B | B B B |
| N B B | N B B |
| B N N | B N N |
| N N N | N N N |

It is suggested, therefore, some of the subjects over- generalize the Noun Extrametricality Rule to all three syllable words. For other subjects, only the final syllables of 3-syllable nouns are subject to Noun Extrametricality, and the verbs are not affected, yielding different patterns in the verbs and nouns.

The other type of irregular pattern involves the 4- syllable nouns which are of the configuration of XBBY (X and Y can be B or N). The results show that quite a considerable number of subjects placed the stress on the antepenultimate syllable, which is not rule-predicted. We argue that the incorrect output may be due to the modification of the Strong Retraction Rule.

In describing the stress patterns in terms of metrical theory (Hayes 1981), English is found to have binary left-dominant feet. This means that in the metrical foot, only the left node may branch. Therefore, there are only three possible types of well-formed foot structure in English:

(8) Foot Structures created by English Stress Rule



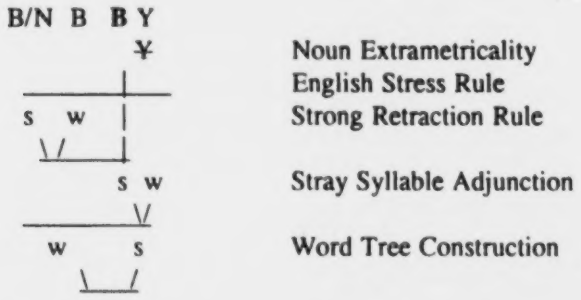

It can be seen that only a non-branching rime can be dominated by a weak node, if the rime is branching, it must be a foot on its own or the left strong node of the foot.

Let us examine the Strong Retraction Rule, which is repeated here for reference:

(9) Strong Retraction Rule (Hayes' 1981)
Form quantity insensitive, left dominant feet, going from right to left across the word.

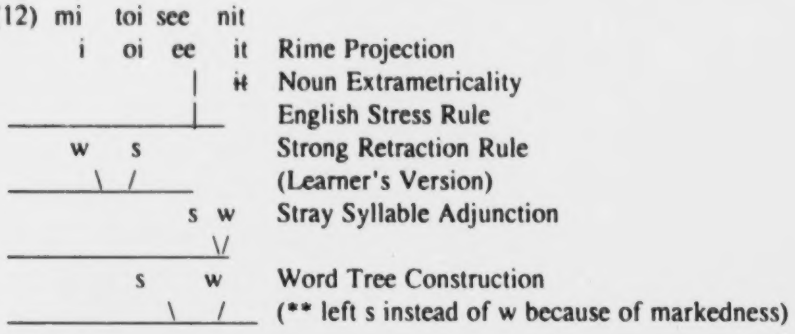
Some feet of the ill-formed types as those in (8d) or (8e) will be created by the Strong Retraction Rule especially in the case of the XBBY rime structures.

(10) Foot structures created by Strong Retraction Rule




(11) Strong Retraction Rule (Learner's version)
Form quantity sensitive binary feet, going from right to left across the word.

(12)

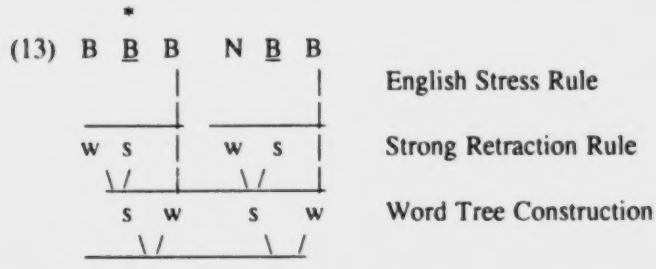



The derivation in (10) shows that the Strong Retraction Rule creates an s w foot to a BB rime structure, which does not conform to the well-formedness of the default foot structure. Therefore, the conjecture here is that for some subjects, the Strong Retraction Rule constructs foot in accordance to the default -- only the strong node can dominate a branching rime and a non-branching rime must be dominated by a weak node.

Thus a foot conforming to the English Stress Rule will be built instead of the one proposed above. For these learners, the derivation of an XBBY word will be as in (12).

The example in (12) illustrates how a right-dominant foot is created by the learners' Strong Retraction Rule. This foot is a `marked' one because according to the English Stress Rule, all the feet created should be left-dominant. Therefore, it is further conjectured that because of this `markedness', the foot attracts the primary stress, altering also the nature of the word tree as well. This also points out the fact that there is an inherent conflict between syllable quantity and the left- dominant foot structure in English word stress assignment. When encountering words of more than three syllables, the learners are faced with the dilemma of having to decide whether the syllable structure or the foot structure is more determinant.

This revised version of the Strong Retraction Rule may also contribute to the incorrect stress pattern in the 3-syllable BBB and NBB verbs.




Although the discussion concerning the irregular patterns is merely conjectural and is subject to further confirmation from future research, it is worth noting that both the regular and irregular patterns can be explained by the metrical theory.

## 5.2. Second Language Acquisition

### 5.2.1. Learners' Strategy

Earlier discussions in this chapter have shown that the acquisition of English word stress is a complicated process which involves the ability to identify the various parameters that are relevant, and of equal importance, an understanding of the interaction of these parameters. However, in the initial

stage of acquisition, ESL learners may have difficulties in both of these. This is shown when learners begin to cope with language learning problems by some learners' strategies.

There is one subject in this study whose stress placement is based on syllable position. Subject 07, a secondary student who scored the least in the pronunciation test[5] (the score was 17 out of 50), placed the stress on the final syllable for almost all the 2- syllable nouns and verbs. Out of all his 29 responses with the intended syllable structures preserved, 27 words received final stress (i.e. 93% of the cases). For the 3-syllable verbs and nouns, in 49 out of the 58 (i.e. 85% of the cases) responses with the intended syllable structures preserved, the stress was placed on the penultimate syllable. However, such a syllable position- based strategy was not apparent in 4-syllable nouns. Out of the 52 responses with the intended syllable structures preserved, 22 indicated penultimate stress and 29 indicated antepenultimate stress (1 on final). And this distribution was not patterned according to syllable types but random. That is to say, for the 4 test words of each of the syllable structure types, some were penultimately-stressed and some were antepenultimately-stressed. No pattern or strategy of any type could be discerned from the responses. This indicates that the stress placement of this subject in the 4-syllable words is randomly distributed between the penultimate and antepenultimate syllables. Since this subject represents an elementary stage of development in learning English (reflected from the low score he obtained in the pronunciation test), an approach to stress assignment based on a fixed syllable position may illustrate a very elementary strategy for handling word stress by ESL learners. A certain syllable is identified to receive the primary stress in a word of a certain length, such as the final syllable in a 2-syllable word, the penultimate syllable in a 3-syllable word and so on. Since the same strategy does not appear in the 4-syllable words, it is suspected that this rudimentary strategy is sensitive to the number of syllables in a word. Moreover, because of the random responses in the 4-syllable words and the syllable-based pattern observed in the 2 and 3-syllable words, it is speculated that word length in terms of number of syllables is an obstacle in determining stress placement.

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[5] A pronunciation test was incorporated in the present study to test the proficiency level of the subjects. This part has not been included in the paper because of space limitations.

### 5.2.2. L1 Transfer

In acquiring the sound system of a second language, a learner is inevitably influenced by his mother tongue, both phonetically and phonologically. Therefore, in the acquisition of English word stress, it will be more likely for a learner whose L1 also demonstrates word stress to transfer the stress patterns of his L1 to L2 than one whose L1 does not have word stress. However, the lack of such a phonological category in L1 may induce other kinds of transfer. For example, Cantonese is said to be a syllable-timed language in which each syllable carries about the same amount of time. This may lead to transfer to English in the form of a lower degree of vowel reduction which is essential in the production of English word stress. Furthermore, even if they are sensitive to English stress rules, Cantonese speakers may have problems in approximating native norms in realizing word stress. They may experience difficulties in making full use of duration, intensity and pitch change to achieve the surface phonetic effects of stress. For example, it was observed impressionistically by the author that though the primary word stress produced by most subjects in this study could be discerned, it was not possible to distinguish a secondary level or third level of stress in their production. The effects of L1 transfer, at the phonetic level, should be of great interest but will require a separate acoustical study of L2 speech production which falls outside the scope of the present research.

Previous studies on the acquisition of word stress by speakers of Brazilian Portuguese speakers (Baptista 1989) and Spanish speakers (Mairs 1989) find that L1 transfer is present in the interlanguage system of ESL learners. Baptista (1989) found that her subjects placed the primary stress of English words at a syllable where in the Portuguese cognate, that same syllable should receive the secondary stress. Mairs (1989) found that L1 transfer among her Spanish subjects was present in their rime structure. The markedness of a -VGC# in Spanish blocks Extrametricality in the derivation of stress. The results of this study show that L1 transfer of the types described above is not present in the acquisition of English word stress by Chinese ESL learners, at least not in terms of stress assignment.

## 6 Conclusion

The present study has investigated the acquisition of English word stress employing the metrical framework. In the metrical theory, stress assignment is stated explicitly in terms of a set of parameters which include the concepts of branching rime structure, dominance in foot and word tree construction,

directionality in rule application and extrametricality. These parameters are found to be relevant in the acquisition of English word stress by ESL learners. In general, learners are sensitive to the concept of branching versus non-branching rimes. However, it was found that in the classification of branching and non-branching rime structure, the subjects of this study only regarded a VV (i.e. a long vowel or diphthong) but not a VCC (i.e. a short vowel followed by two or more consonants) as branching. This accounts for some of the stress patterns not predicted by rule. Learners were also found to have demonstrated the construction of right-dominant metrical feet and left-dominant word trees in the course of stress assignment. The difference of stress patterns in the syntactic categories of nouns and verbs illustrated that Noun Extrametricality played a role in determining stress in the interlanguage of the learners. In addition to this, the directionality of rule application was shown in the stress patterns as well. In short, it was found by the present study that the stress patterns of the ESL learners of some coined English words can be accounted for in terms of the parameters set out in the metrical theory.

From the point of view of second language acquisition, stress appears to be acquired early. In terms of rule-predicted responses, there was little difference shown by the two groups, the proficiency level of which indicated considerable difference. Learner strategy was found to be present in one of the subjects, who relied on the syllable position to assign stress. The stress patterns of this subject showed the strategy of stressing the final syllable in 2-syllable words, the penultimate syllable in 3-syllable words and stress either the penultimate or antepenultimate syllable in 4- syllable nouns.

The transfer of Cantonese in stress placement is not detected in this study. The absence of lexical stress in Cantonese does not appear to create a lot of difficulty to ESL learners in their acquisition of English word stress.

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## APPENDIX

Table 1: Example of Regularly-Patterned Results

VJBNB (i.e. 3-syllable verbs with branching rimes in initial and final syllables but non-branching rime in second syllable)

| SUBJECTS | UNDERGRADUATE | | | SECONDARY | | |
|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | NO. OF RESPONSES | | |
| STRESS ON | ante | *penult | *final | ante | *penult | *final |
| TOIsapaw<br>VV V VV | 6 | 1 | 0 | 5 | 0 | 0 |
| SIKnabey<br>VC V VV | 7 | 0 | 0 | 3 | 2 | 0 |
| HYsedect<br>VV V VCC | 6 | 1 | 0 | 2 | 0 | 0 |
| LEFgenikt<br>VC V VCC | 5 | 1 | 0 | 2 | 1 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 2: Example of Irregularly-Patterned Results

VJBBB (i.e. 3-syllable verbs with branching rimes in all three syllables)

| SUBJECTS | UNDERGRADUATE | | | SECONDARY | | |
|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | NO. OF RESPONSES | | |
| STRESS ON | ante | *penult | *final | ante | *penult | *final |
| BAWtigpai VV VC VV | 3 | 3 | 0 | 2 | 1 | 0 |
| DANlaisoy VC VV VV | 2 | 4 | 0 | 0 | 2 | 0 |
| LOUsapkust VV VC VCC | 3 | 4 | 0 | 3 | 2 | 0 |
| FELrenhast VC VC VCC | 3 | 5 | 0 | 2 | 2 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 3
Stress Patterns Observed

| NUMBER OF SYLLABLES | REGULAR | | IRREGULAR | |
|---|---|---|---|---|
| | VERB | NOUN | NOUN | VERB |
| TWO | **B** N<br>***N*** N | **B** B<br>***N*** B<br>**B** N<br>***N*** N | | **B** **B**<br>***N*** **B** |
| THREE | N **B** N<br>B **B** N<br>**B** N B<br>***N*** N B | N **B** N<br>B **B** N<br>**B** N B<br>***N*** N B | | |
| FOUR | | B **B** B<br>N **B** B<br>**B** N N<br>***N*** N N | | **B** **B** B<br>***N*** **B** B<br>**B** ***N*** N<br>***N*** ***N*** N |
| FIVE | | B **B** N B<br>B **B** N N<br>N **B** N B<br>N **B** N N<br>B N **B** B<br>B N **B** N<br>N N **B** B<br>N N **B** N | | |
| SIX | | B ***N*** N B<br>B ***N*** N N<br>N ***N*** N B<br>N ***N*** N N | | |
| SEVEN | | | B **B** **B** B<br>B **B** **B** N<br>N **B** **B** B<br>N **B** **B** N | |

Note: primary stress is indicated by bold face, italicization and underlining

Table 4: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2BB (i.e. 2-syllable verbs with branching rimes in both syllables)

| SUBJECTS | UNDERGRADUATE | | SECONDARY | |
|---|---|---|---|---|
| | NO. OF RESPONSES | | NO. OF RESPONSES | |
| STRESS ON | *penult | final | *penult | final |
| abNAW<br>VC VV | 0 | 7 | 0 | 8 |
| bawTEY<br>VV VV | 2 | 5 | 4 | 2 |
| poiKAPT<br>VV VCC | 5 | 2 | 4 | 1 |
| vipGAND<br>VC VCC | 6 | 1 | 3 | 3 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 5: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2NB (i.e. 2-syllable verbs with non-branching rime
in initial syllable but branching rime in final syllable)

| SUBJECTS | UNDERGRADUATE | | SECONDARY | |
|---|---|---|---|---|
| | NO. OF RESPONSES | | NO. OF RESPONSES | |
| STRESS ON | *penult | final | *penult | final |
| baGOY<br>V VV | 2 | 3 | 2 | 4 |
| teTAY<br>V VV | 1 | 7 | 2 | 5 |
| veBUST<br>V VCC | 5 | 2 | 3 | 2 |
| qaLISK<br>V VCC | 4 | 3 | 3 | 3 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 6: Stress Patterns of 2-Syllable Nouns
(with intended syllable structure preserved)

N2BB (i.e. 2-syllable nouns with branching rimes in both syllables)

| SUBJECTS | UNDERGRADUATE | | SECONDARY | |
|---|---|---|---|---|
| | NO. OF RESPONSES | | NO. OF RESPONSES | |
| STRESS ON | penult | *final | penult | *final |
| TEEwaw<br>VV VV | 6 | 2 | 5 | 3 |
| TACboi<br>VV VV | 6 | 2 | 5 | 2 |
| MOOtand<br>VV VCC | 4 | 2 | 5 | 1 |
| SEKnast<br>VC VCC | 6 | 0 | 4 | 1 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 7: Stress Patterns of 2-Syllable Nouns
(with intended syllable structure preserved)

N2NB (i.e. 2-syllable nouns with non-branching rime in initial syllable but branching rime in final syllable)

| SUBJECTS | UNDERGRADUATE | | SECONDARY | |
|---|---|---|---|---|
| | NO. OF RESPONSES | | NO. OF RESPONSES | |
| STRESS ON | penult | *final | penult | *final |
| MItern<br>V VV | 4 | 2 | 3 | 3 |
| LEkɜw<br>V VV | 1 | 4 | 3 | 1 |
| FIgict<br>V VCC | 6 | 0 | 4 | 0 |
| FImact<br>V VCC | 5 | 2 | 1 | 1 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 8: Stress Pattern of 3-syllable Nouns

N3BBN (i.e. 3-syllable nouns with branching rimes in initial two syllables but non-branching rime in final syllable)

| SUBJECTS | UNDERGRADUATE | | | SECONDARY | | |
|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | NO. OF RESPONSES | | |
| STRESS ON | *ante | penult | *final | *ante | penult | *final |
| tarHARlin VV VV VC | 1 | 7 | 0 | 0 | 5 | 0 |
| gabSOOma VC VV V | 1 | 7 | 0 | 1 | 5 | 0 |
| takDEMlit VC VC VC | 5 | 3 | 0 | 4 | 3 | 0 |
| kawTIPna VC VC V | 1 | 5 | 0 | 2 | 2 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 9: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2BN (i.e. 2-syllable verbs with branching rime
in initial syllable and non-branching rime
in final syllable)

| SUBJECTS | UNDERGRADUATE | | SECONDARY | |
|---|---|---|---|---|
| | NO. OF RESPONSES | | NO. OF RESPONSES | |
| STRESS ON | penult | *final | penult | *final |
| KOUba<br>VV V | 6 | 0 | 5 | 0 |
| ZIPda<br>VC V | 7 | 0 | 5 | 0 |
| GUMnit<br>VC VC | 7 | 1 | 5 | 0 |
| FOOseg<br>VV VC | 5 | 1 | 5 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 10: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2NN (i.e. 2-syllable verbs with non-branching rime in both syllables)

| SUBJECTS | UNDERGRADUATE | | SECONDARY | |
|---|---|---|---|---|
| | NO. OF RESPONSES | | NO. OF RESPONSES | |
| STRESS ON | penult | *final | penult | *final |
| HAca<br>V V | 2 | 0 | 1 | 0 |
| GEfa<br>V V | 6 | 0 | 2 | 0 |
| MAlan<br>V VC | 3 | 2 | 5 | 1 |
| VEkan<br>V VC | 4 | 0 | 3 | 4 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 11: Stress Pattern of 3-syllable Verbs

VJBBN (i.e. 3-syllable verbs with branching rimes in initial two syllables but non-branching rime in final syllable)

| SUBJECTS | UNDERGRADUATE | | | SECONDARY | | |
|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | NO. OF RESPONSES | | |
| STRESS ON | *ante | penult | *final | *ante | penult | *final |
| poiVEYtik<br>VV VV VC | 1 | 5 | 0 | 0 | 3 | 0 |
| imPEKtet<br>VC VC VC | 1 | 6 | 0 | 1 | 3 | 0 |
| terNETma<br>VV VC V | 2 | 4 | 0 | 0 | 4 | 0 |
| zanPARha<br>VC VV V | 1 | 2 | 0 | 0 | 2 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 12: Stress Pattern of 3-syllable Verbs

V3NBN (i.e. 3-syllable verbs with non-branching rimes in initial and final syllables but branching rime in second syllable)

| SUBJECTS | UNDERGRADUATE | | | SECONDARY | | |
|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | NO. OF RESPONSES | | |
| STRESS ON | *ante | penult | *final | *ante | penult | *final |
| seTAIba<br>V VV V | 1 | 5 | 0 | 0 | 1 | 0 |
| gaTILda<br>V VC V | 1 | 7 | 0 | 0 | 2 | 0 |
| maTAMren<br>V VC VC | 2 | 5 | 0 | 1 | 3 | 0 |
| teGARwin<br>V VC VC | 0 | 6 | 0 | 0 | 0 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 13: Stress Pattern of 3-syllable Verbs

V3BBB (i.e. 3-syllable verbs with branching rimes in all three syllables)

| SUBJECTS | UNDERGRADUATE | | | SECONDARY | | |
|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | NO. OF RESPONSES | | |
| STRESS ON | ante | *penult | *final | ante | *penult | *final |
| BAWtiqpai VV VC VV | 3 | 3 | 0 | 2 | 1 | 0 |
| DANlaisoy VC VV VV | 2 | 4 | 0 | 0 | 2 | 0 |
| LOUsapkust VV VC VCC | 3 | 4 | 0 | 3 | 2 | 0 |
| FELrenhast VC VC VCC | 3 | 5 | 0 | 2 | 2 | 1 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 14: Stress Pattern of 3-syllable Verbs

V3BNB (i.e. 3-syllable verbs with branching rimes in initial and final syllables but non-branching in second syllable)

| SUBJECTS | UNDERGRADUATE | | | SECONDARY | | |
|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | NO. OF RESPONSES | | |
| STRESS ON | ante | *penult | *final | ante | *penult | *final |
| TOIsapaw VV V VV | 6 | 1 | 0 | 5 | 0 | 0 |
| SIKnabey VC V VV | 7 | 0 | 0 | 3 | 2 | 0 |
| HYsedect VV V VCC | 6 | 1 | 0 | 2 | 0 | 0 |
| LEFgenikt VC V VCC | 5 | 1 | 0 | 2 | 1 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 15: Stress Pattern of 4-syllable Nouns

N4BNBB (i.e. 4-syllable nouns with branching rimes in initial and final two syllables but non-branching in second syllable) .

| SUBJECTS | UNDERGRADUATE | | | | SECONDARY | | | |
|---|---|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | | NO. OF RESPONSES | | | |
| STRESS ON | *pre | *ant | pen | *fin | *pre | *ant | pen | *fin |
| leesiKATpai<br>VV V VC VV | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 0 |
| filwaZAWdai<br>VC V VV VV | 0 | 0 | 3 | 0 | 0 | 0 | 4 | 0 |
| dailiGATnust<br>VV V VC VCC | 0 | 2 | 3 | 0 | 1 | 1 | 0 | 0 |
| makqaTAWpect<br>VC V VV VCC | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Key: pre=pre-antepenultimate
ant=antepenultimate
pen=penultimate
fin=final

Table 16: Stress Pattern of 4-syllable Nouns

N4BNBN (i.e. 4-syllable nouns with branching rimes in initial and third syllables but non-branching rimes in second fourth syllables)

| SUBJECTS | UNDERGRADUATE | | | | SECONDARY | | | |
|---|---|---|---|---|---|---|---|---|
| | NO. OF RESPONSES | | | | NO. OF RESPONSES | | | |
| STRESS ON | *pre | *ant | pen | *fin | *pre | *ant | pen | *fin |
| kaitiPOOsin VV V VV VC | 0 | 1 | 5 | 0 | 1 | 0 | 4 | 0 |
| migkaSEYta VC V VV V | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 |
| fawbeLEKna VV V VC V | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| netgiSAPnis VC V VC VC | 0 | 1 | 4 | 0 | 0 | 0 | 2 | 0 |

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Key: pre=pre-antepenultimate
ant=antepenultimate
pen=penultimate
fin=final